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# Eclipse 500 Overview

May 24<sup>th</sup>, 2006

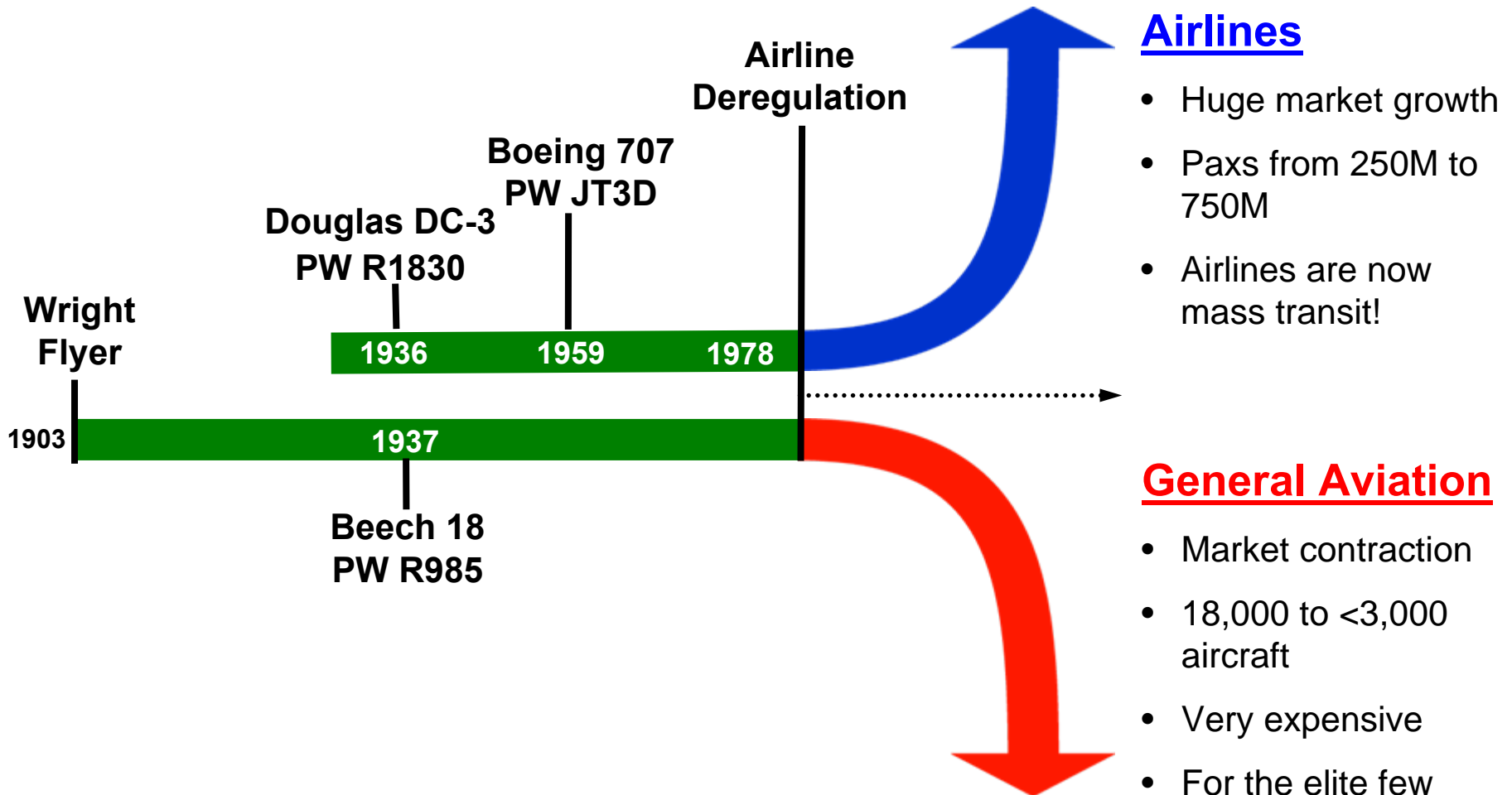


Peg Billson  
Eclipse Aviation  
Chief Operating Officer



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# General Aviation: A Historic Perspective





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# Eclipse Is Changing the Value Proposition for Private Jet Travel



- **For 3+ decades aircraft manufacturers have been stuck on the same value curve**
  - Improve the product and charge more
- **Eclipse is moving the value curve to the right**
  - Performance equal to or better than current jets
  - Technology and capability normally found in jets costing many millions more
  - Price  $\frac{1}{3}$  cost of current entry-level jets
  - Operating costs  $\frac{1}{2}$  current entry-level jets
  - Designed for airline like high hours/high cycle operations with equal reliability/dispatchability
- **Which leads to market expansion and creation**
  - Expanding private jet travel to a broader segment of the population
  - Creating new markets via the new value proposition



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# Key Strategies

- **Software integration airplane company**
- **Enable the entire ownership experience**
- **Embrace disruptive technologies**



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# Deliberate Approach

- **Invest in innovation and partner with the FAA**
  - **Aircraft design**
    - Safety paramount
      - 10 year accident analysis used to drive design reviews
    - New time and money saving processes
    - FAA participated in preliminary design review
  - **Training**
    - Train to proficiency, not PTS
  - **Maintenance**
    - One FAA Part 145 Repair Station
    - MSG-3



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# **Aircraft Design, Development & Certification Strategy**

- **Safety designed in**
- **Full usage of 3D digital modeling (CAD) and analysis (CAE)**
- **High level of simulation and iteration early in the design**
- **Friction stir welding**
- **Reduced part-count, advanced assembly practices**
- **Lay out processes simultaneously with design**
  - **Ask for FAA's input and help early on**
- **New forms of communication**



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## Safety : Large Envelope with Low Inertia

- **Low Stall / Landing speeds**

$$V_{so} = 67 \text{ kts}$$

$$V_{ref} = 87 \text{ kts}$$

$$V_{mc} < V_{so}$$

- **High gear/flap speeds**

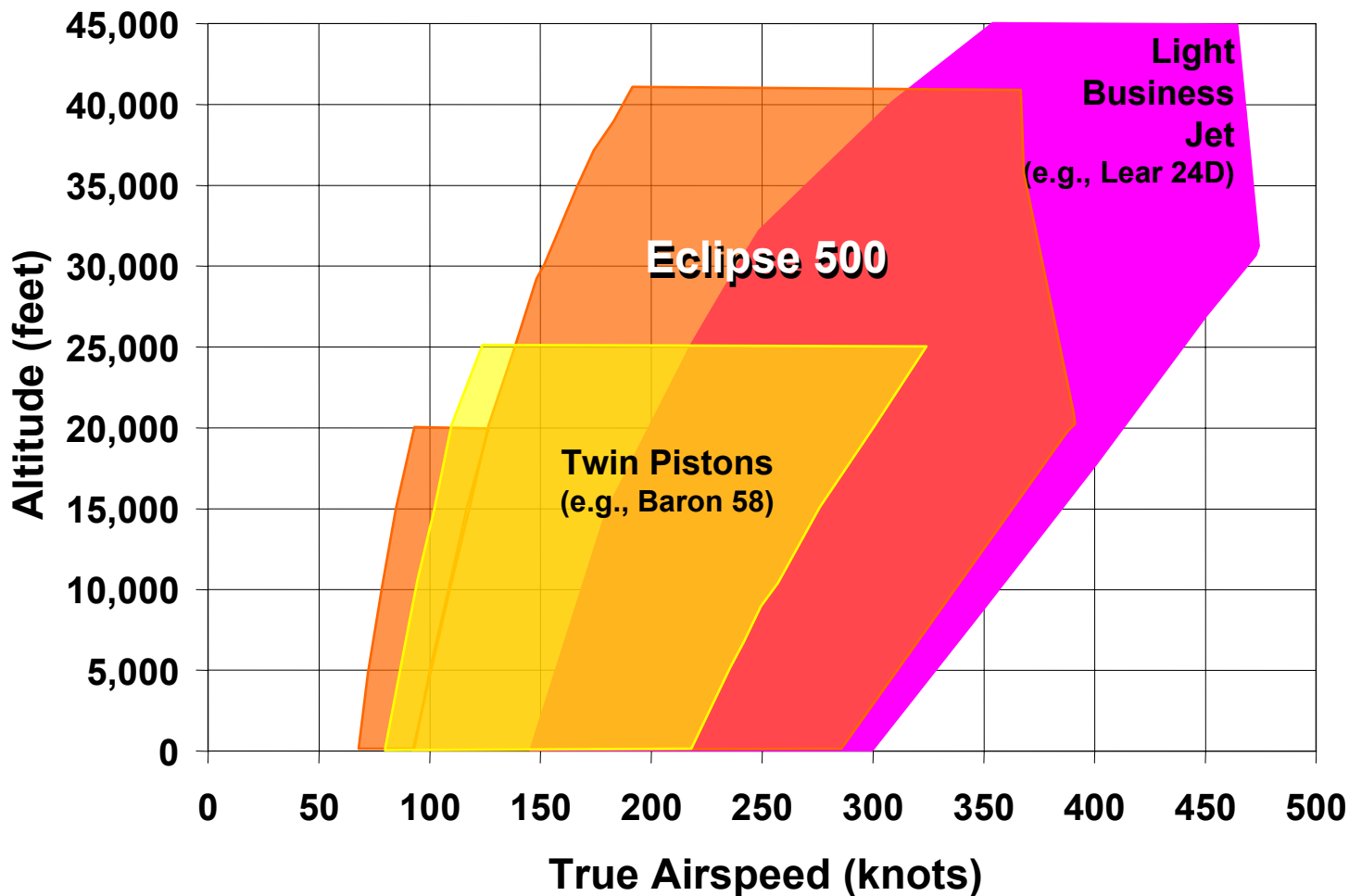
$$V_{FE} = 200 \text{ kts}$$

$$V_{LO} = 250 \text{ kts}$$

$$V_{LE} = 285 \text{ kts}$$

$$V_{MO} = 285 \text{ kts}$$

- **Prop-like accelerate / decelerate rates**





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# Safety: Avio



- **Avio presents useful information, not just data**
  - Avio displays information, rather than requiring the pilot to pull information from data
  - Avio only displays information the pilot can do something about
- **Avio: your virtual co-pilot**
  - Avio handles traditional co-pilot functions during all phases of flight
  - Pilot always remains in command as final decision maker
  - Allows pilots to take full advantage of automation, without sacrificing control
- **Power availability designed for better than  $10^{-12}$** 
  - No mechanical back-up required

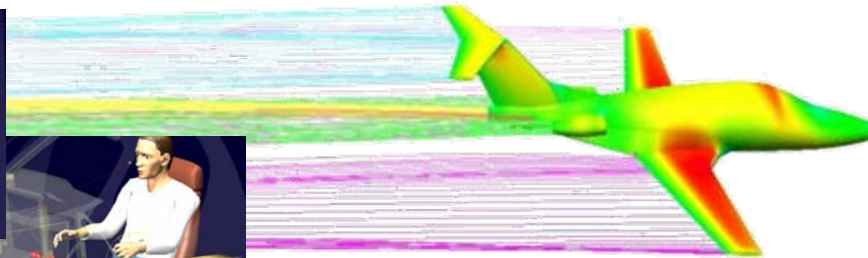


# Simulations

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Ergonomics  
& Flt Sim



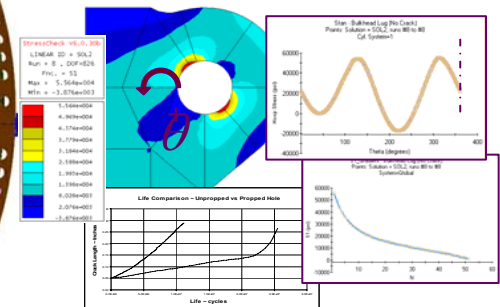
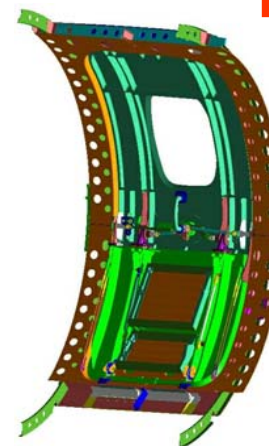
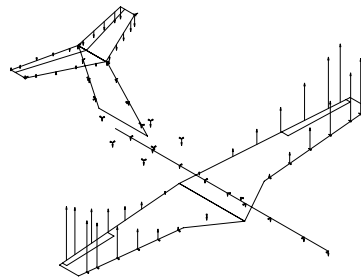
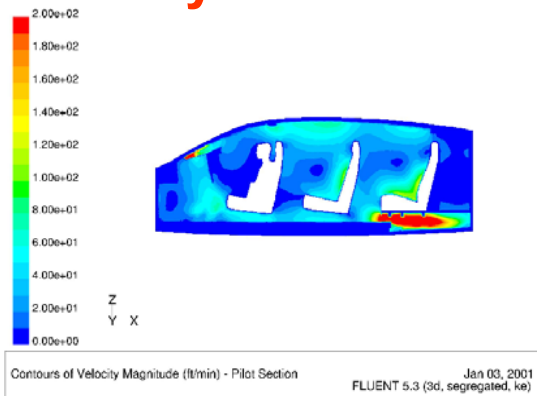
CFD & Wind Tunnel



Systems

Flutter

Design, Stress, DT

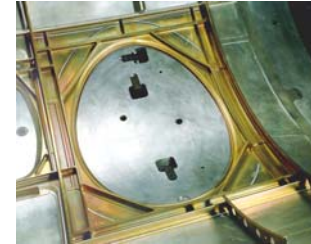




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# Friction Stir Weld

- 5,354 in. (136m) of weld per aircraft
- Replaces 7,378 rivets
- 10X faster cycle time
- 1,800 labor hours reduced
- Entire shipset can be welded in 1 shift
- Virtually eliminates rework
- Standard repairs with rivets
- Stronger and better fatigue performance riveted structure





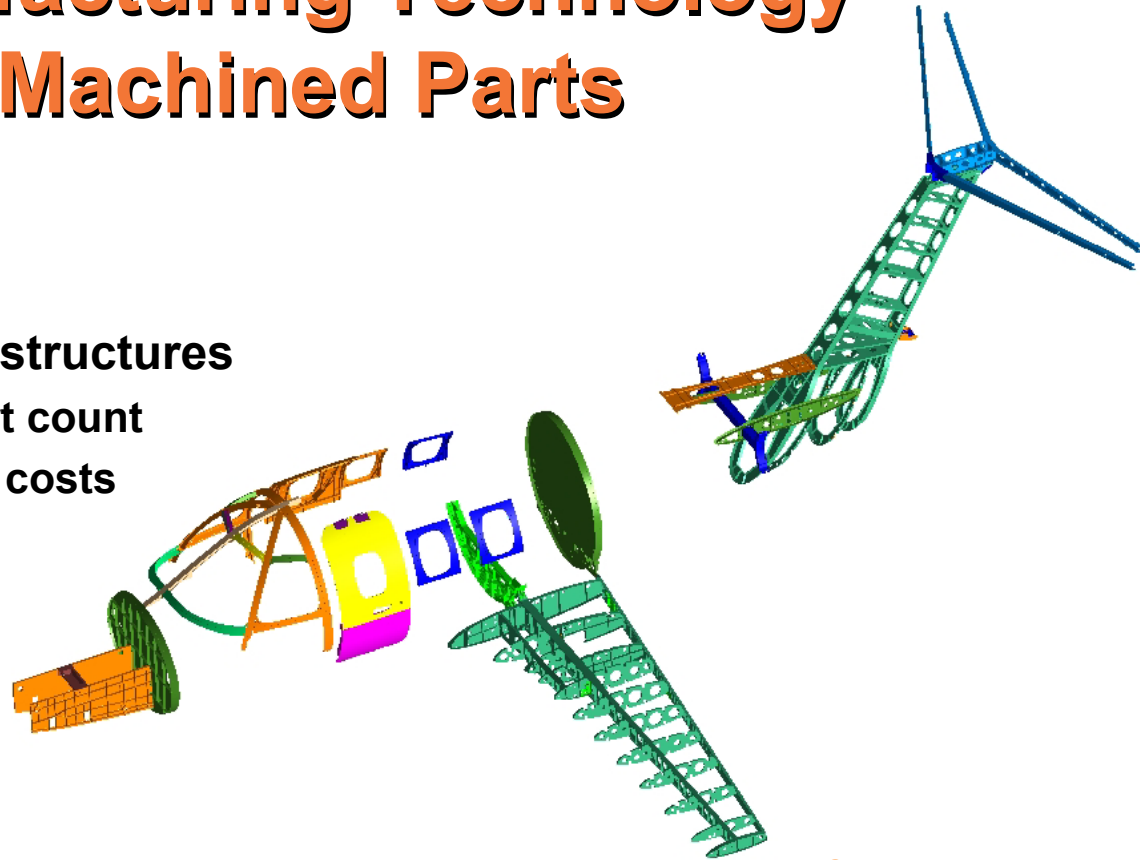
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# Manufacturing Technology

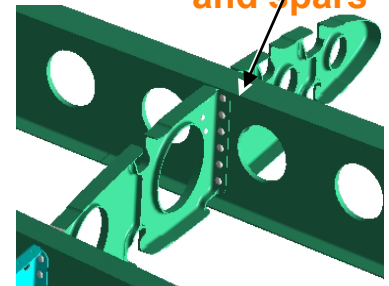
## Machined Parts

- **Extensive usage of machined structures**

- Reduced logistics – lower part count
- Improved quality and re-work costs
- Weight savings
- Reduced assembly time
- Reduction in labor cost
- Reduced tooling
- Parts are directly read from CAD file to CNC (machining) and CMM (inspection) machines
- Reduced part fabrication time



Coordinated pilot  
holes b/w ribs  
and spars





# Certification Process

- **Worked with FAA from the beginning**
  - PSP/PSCP in 1999
  - FAA fully involved in design iterations
  - Worked ELOS and exemptions very early in development
  - Aircraft level functional hazard assessment agreed upon 6 years prior to certification
  - Partnership versus adversaries
  - Learned from each other
    - Example – PhostrEx™
      - Received feedback from tech Center
      - Early buy-in
      - FAA involved before certification testing
- **EASA certification in parallel**





# Eclipse Training Programs

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- **Pilot training partnership with United**
  - Training program is highly structured
  - Evaluation required to ensure success
  - Requires significant pre classroom effort – self study courses and unusual situation courses
  - Type Transition Course – 7 days in length to train to proficiency, not hours
  - Mentoring – required for ALL new turbine pilots
  - **ALL ECLIPSE PILOTS WILL BE TRAINED TO AIRLINE STANDARDS**
- **Maintenance training**
  - Systems training same as pilot training
  - Embedded P&WC engine training
  - Web-based and hands-on training



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# Communications

- **Electronic**
  - **Integrated SAP early on**
  - **File all certification paperwork electronically**
    - Not email
    - Web-enabled database accessed by FAA directly
  - **Electronic record:**
    - As designed
    - As built
    - As maintained
- **Face to face**
  - **Daily interaction with specialists**
  - **Monthly management meetings**
  - **High level FAA visits**



# Eclipse Aviation Is Succeeding

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- Flight testing with five FAA conforming aircraft (1,900 flight hours)
- Static airframe testing complete, fatigue article in final assembly
- Over \$500M of equity/debt raised



- Just under 2,500 orders secured w/deposits
- 210,000 ft<sup>2</sup> of facilities in place , additional 142,000 ft<sup>2</sup> under construction
- Company is 625+ employees and growing to over 1,000 by year end
- In final stages of FAA certification
- Started production line – 6 Airplanes in flow



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# 2005 Robert J. Collier Trophy Recipient



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# **Eclipse 500 Overview**

## **Rotorcraft Directorate Designee Conference**

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